

What is claimed is:

1. A plasma processing method comprising the step of:
etching a silicon layer of an object to be processed
5 by employing a patterned mask and by using a plasma of a
processing gas introduced into an airtight processing
chamber, containing a gaseous mixture of HBr, O₂ and SiF₄
and, additionally, one or both of SF₆ and NF₃,
wherein a gas containing C and F is further added to the
10 processing gas.
2. The plasma processing method of claim 1, wherein the
gas containing C and F is one or more gases selected from
the group consisting of CF₄, C₄F₈, C₅F₈, C₄F₆, CHF₃ and CH₂F₂.
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3. The plasma processing method of claim 1, wherein the
gas containing C and F is added to the processing gas in a
middle of the etching step.
- 20 4. The plasma processing method of claim 3, wherein the
gas containing C and F is continuously added to the
processing gas until the end of the etching step.
5. The plasma processing method of claim 1, wherein the
25 gas containing C and F is added to the processing gas for a
period of time during the etching step.

6. The plasma processing method of claim 1, wherein the timing of starting to add the gas containing C and F to the processing gas is determined according to the opening diameter of holes or the opening width of grooves formed by the etching step.

7. The plasma processing method of claim 1, wherein the opening diameter of holes or the opening width of grooves formed by the etching step is smaller than or equal to about 0.2 μm .

8. The plasma processing method of claim 1, wherein the patterned mask includes at least an oxide layer containing silicon.